U.S. Department of Energy
Office of River Protection
P.O. Box 450, MSIN H6-60
Richland, Washington 99352

0070691

AUG 24 2006

06-TOD-069

Ms. Jane Hedges, Program Manager
Nuclear Waste Program
Washington State
Department of Ecology
3100 Port of Benton Blvd.
Richland, Washington 99354

RECEIVED
AUG 30 2006
EDMC

Dear Ms. Hedges:

SUBMITTAL OF TANK LEAK ASSESSMENT PROCESS PROCEDURE AND OPERATING SPECIFICATIONS FOR TANK FARM LEAK DETECTION AND SINGLE-SHELL TANK INTRUSION DETECTION

Reference: Ecology letter from J. J. Lyon to R. J. Schepens, ORP, "Re: Letter 06-TOD-043, dated June 27, 2006, from R. Schepens, USDOE, to J. Hedges, Ecology, 'Request for Extension to the due Dates Responding to the Assumed Leak from Catch Tank 241-ER-311 and UX-302A,'" dated July 24, 2006.

This letter transmits, "Tank Leak Assessment Process Procedure TFC-ENG-CHEM-D-42, REV A-1, Enclosure 1, and "Operating Specifications for Tank Farm Leak Detection and Single-Shell Tank Intrusion Detection" OSD-T-151-00031, Revision G-2, Enclosure 2, as requested in the Reference.

Thresholds for initiation of the leak assessment process procedures have been recently revised to more stringent reporting criteria. These revisions were put into place after the U.S. Department of Energy (DOE), Office of River Protection (ORP) had conservatively made notification of assumed leaks from Catch Tanks 241-ER-311 and UX-302A.

If you have any questions, you may contact me, or your staff may contact Michael J. Royack, Tank Farms Operation Division, (509) 376-4420.

Sincerely,

Roy J. Schepens

Roy J. Schepens, Manager
Office of River Protection

TOD:MJR

Enclosures (2)

cc: See page 2

cc w/encls:
M. N. Jaraysi, CH2M HILL
M. A. Knight, CH2M HILL
P. Miller, CH2M HILL
S. Harris, CTUIR
J. J. Lyon, Ecology
T. Martin, HAB
G. Bohnee, NPT
K. Niles, ODOE
A. Conklin, WDOH
J. Martell, WDOH
R. Jim, YN
Administrative Record
CH2M HILL Correspondence
Environmental Portal, LMSI

Enclosure 1
06-TOD-069

"Tank Leak Assessment Process Procedure TFC-ENG-CHEM-D-42, REV A-1

(14 pages total, including coversheet)

FUNCTIONAL AREA MANAGER: S. M. Mackay

DOCUMENT OWNER: D. A. Barnes

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TABLE OF FIGURES

1.0 PURPOSE AND SCOPE

This guidance document defines a process for investigating, evaluating, and reporting a potential tank leak within the tank farms facility. It includes the process, products, responsibilities, and time frame required. When directed by management, the same process can also be used to evaluate any proposed change in a tank's leak status, (i.e., "assumed leaker" to "sound").

This guidance document includes the following key components:

- Methods of initiating the evaluation process, including applicable data thresholds,
- Allotted times for completing each step,
- Personnel responsible for each step in the process,
- Description of the process for determining the tank leak classification (assumed leaker or sound), and
- Declaration of resulting tank classification.

This guidance document may be applied to any nuclear waste storage tank within the tank farms facility, including single-shell tanks (SSTs), double-shell tanks (DSTs), aging waste tanks, and all active catch tanks. Additional tanks or facilities may also be evaluated using this process when directed by management. The primary focus of this process is leak assessment (level decreases), but it can also be used to assess intrusions (level increases) or any other proposed change in tank status at the direction of management.

The process described in this document applies to any Hanford high-level waste tank suspected of having an active leak to the environment, regardless of current classification. The process described in this section will result in the tank being classified as "sound" or "assumed leaker."

2.0 IMPLEMENTATION

This guidance document is effective on the date shown in the header.

3.0 RESPONSIBILITIES

Responsibilities are contained within Section 4.0.

4.0 GUIDANCE

4.1 Initial Indications/Data Anomalies

With the release of RPP-9937, "Single-Shell Tank System Leak Detection and Monitoring Function and Requirements Document," as a primary Tri-Party Agreement document, many of the SSTs are now exempt from environmentally-driven leak detection requirements. Any tank that does not require leak detection monitoring (LDM) per RPP-9937 is exempt from the requirements of this guidance document; however, this guidance document may be applied to those tanks when directed by management.

Any data point that is outside the allowable criteria shall be evaluated for the effects of barometric pressure, and the data corrected for those effects where applicable.

If a corrected data point exceeds the tank level decrease criteria (specification limits) as established in OSD-T-151-00031, the following actions shall be performed:

DST System Engineering personnel	1. Request that the equipment used to obtain the data be checked for mechanical, electrical, and/or calibration problems that might invalidate the data point.
	2. Request that the anomalous data be re-sampled within three working days to verify repeatability. If the repeat data is also below the decrease criteria and no equipment problems are identified, the data is considered to be "verified."
	3. If the data anomaly is verified or if it is indeterminate, issue a Problem Evaluation Request (PER) within one working day of the repeat reading. As soon as the data anomaly is verified, the required data collection frequency for the device used to record the anomaly, (normally surface level or Interstitial Liquid Level), shall immediately become "weekly," regardless of the original frequency.
	4. Notify the shift office to collect any additional data on a temporary round sheet per TFC-OPS-OPER-C-08. The weekly readings shall continue until discontinued by direction of the Process Analysis director.
Process Analysis Director	5. Assign responsible engineer(s) to evaluate alternate causes and collect any additional tank data that is required.
Responsible Engineer(s)	6. Evaluate common alternate explanations for the data variations, (i.e., other than a tank leak). The initial assessment shall be completed within three working days. Common alternate explanations include, (but are not limited to), weather changes, (temperature, barometric pressure response, etc.), instrument problems, (calibration and electrical problems), waste surface problems, ventilation rate variations affecting evaporation, waste transfers and drainbacks, and waste disturbing field operations.
Process Analysis Director	7. If a viable alternate explanation is identified, the PER shall be closed, citing that explanation.
Responsible Engineer(s)	8. If a data anomaly is verified or indeterminate and no viable alternate explanation is identified within the allowable time period, (three working days), recommend that the formal leak assessment process be initiated, and the PER shall be updated to reflect this information.

Process Analysis Director	9.	Review the available information and recommendations, and, if warranted, officially initiate the formal leak assessment process.
DST System Engineering Manager	10.	Notify the appropriate tank farm facility manager, and request funding to perform a formal leak assessment.
Process Analysis Director	11.	Assign a Leak Assessment Coordinator and a team of analysts with the necessary range of expertise to thoroughly evaluate all available data per Section 4.2.2 of this document.
DST System Engineering Manager	12.	Notify the Office of River Protection (ORP) via e-mail that a formal leak assessment has been initiated.

4.2 Leak Assessment Process

4.2.1 General

There are three ways that a leak assessment can be initiated:

1. An anomalous data point (below allowable tolerance) is verified and no viable alternative explanation is identified within the allowable time period. (See Section 4.1.)

2. Direction is received through the appropriate contracting process requesting that the Tank Farm contractor perform a leak assessment on a particular tank.

   (Spectral logging of drywells surrounding the waste tanks is presently performed outside of the primary tank farm operator contract. If these companies determine from the spectral data that a tank currently classified as "sound" may have leaked in the past, or that a tank may be currently leaking, they typically notify CH2M Hill and ORP of their findings. Upon receipt of written direction from ORP, the leak assessment process shall be initiated.)

3. A formal leak assessment may be initiated at the request of CH2M HILL management on any tank, at any time, for any reason.

The formal leak assessment process is based on probabilistic analysis to assess the mathematical likelihood (probability) that a specific tank is leaking or has leaked. The technical basis for the process and additional details and examples of the methodology for implementing the process can be found in HNF-3747, "Tank Leak Assessment Technical Background." For each step, a description of the process, products, and responsibilities is provided.

4.2.2 Leak Assessment Participants

Participants in the assessment process will be an assigned group of analysts and an assessment coordinator. For a typical single shell tank, the group of analysts should include expertise in the following areas:

- In-tank data - a person with extensive knowledge and experience in reviewing, analyzing, and interpreting in-tank (i.e., surface liquid level and liquid observation well) data;

- Ex-tank data - a person with extensive knowledge and experience in reviewing, analyzing, and interpreting ex-tank (drywell and lateral survey) data; and

- Tank operations and processes - a person with extensive knowledge and experience with operations of the tank, tank history, tank waste characteristics, and in-tank processes.

The same person may provide expertise in more than one area.

Additional analysts may be included, particularly as specific additional expertise is identified as relevant for the specific assessment. The makeup of the panel may be adjusted to complement the available data. (Example: If a catch tank is being evaluated and no drywell data is available, one might consider adding a facility configuration specialist in place of the ex-tank specialist.)

The assessment coordinator will be a person familiar with this process and the technical basis underlying it, with particular knowledge of the probabilistic assessment processes.

4.2.3 Review Available Information

Leak probability assessment consists of seven steps and results in a recommendation regarding classification of the tank as "assumed leaker" or "sound." Guidance and examples of implementation of these steps are provided in HNF-3747.

Assessment coordinator	1. Identify all relevant information and provide to participating analysts. This information includes surface level measurements, liquid observation well measurements, historical gross gamma logs and spectral gamma logs for drywells near the tank, tank process history, and all available corroborating evidence. See Tables 1 and 2 for specific information relating to in-tank and ex-tank data, respectively.
Assigned Analysts	2. Independently review information and make preliminary interpretations and identify questions/additional information needed.

4.2.4 Develop Specific Hypotheses, Identify Relevant Data

Assessment Coordinator	1. Convene workshop with participating analysts to: • Develop specific leak and non-leak hypotheses. Participants must agree on these hypotheses (though they do not need to agree on the relative likelihoods). • Identify the specific data that are relevant to the leak determination and the features (e.g., patterns) of those data. Specifically, for the data in Tables 1 and 2, the analysts shall answer the yes/no/NA question for each potential data element and the questions for corroborating evidence.

Assigned Analysts

2. After the workshop, review the data provided, and any additional information that may be identified. This review has two purposes:

   - Confirm the hypotheses developed in the workshop; and
   - Provide information needed for the assessment of probabilities in the next step.

Assessment Coordinator

3. Confirm with analysts that the hypotheses are still valid. Any changes in hypotheses must be agreed upon by all participating analysts.

4.2.5 Assess Leak Probability

Assessment Coordinator

1. Work with each analyst individually to assess the necessary probabilistic input required to complete Table 3.

   Detailed explanation of this table and the process for eliciting these probabilities is provided in HNF-3747. Specifically, the necessary probabilities are listed below (subject to the limitations noted on Table 3):

   - Prior probability that the tank is leaking or has leaked without consideration of the specific data initiating this process. This establishes any pre-evaluation bias and is typically established at 0.50 (no pre-evaluation bias, either for or against a leak).
   - Conditional probabilities for in-tank data (for both surface liquid level and liquid observation well, if both are available and relevant) given the leak (L) and non-leak (NL) hypotheses. Also, conditional probabilities as needed based on level of independence between in-tank data
   - Conditional probabilities for ex-tank data (for both gross gamma logs and spectral gamma logs, if both are available and relevant) given the leak (L) and non-leak (NL) hypotheses. Also, conditional probabilities as needed based on level of independence between ex-tank data.
   - If in-tank and ex-tank data are not independent of each other, conditional probabilities are needed to define level of dependence.

Assessment Coordinator/Analysts

2. The basis for the assessments should be thoroughly documented by the coordinator and reviewed and concurred with by the analysts.

4.2.6 Prepare Assessment Report

Assessment Coordinator

1. Compile the revised assessments into a preliminary report. Report shall include the following key elements:

   - Summary of tank history
   - Summary of available data reviewed
   - Discussion of hypotheses considered
   - Summary of the analysts' assessment
   - Summary of resulting mathematical probabilities, including completed data sheets.

2. Provide the report to the analysts for review and concurrence.

   Concurrence will be based on the report providing an accurate description of assessed probabilities and the basis for them. It does not necessarily indicate agreement with the assessments of other analysts.

3. Provide preliminary report to the Process Analysis Director.

4.2.7 Present Results to the ~~Plant Review Committee~~Executive Safety Review Board

The ~~Plant Review Committee (PRC)~~Executive Safety Review Board (ESRB) is the decision authority for determining the classification of a tank (either "assumed leaker" or "sound").

Assessment Coordinator

1. Notify the appropriate ~~PRC~~ ESRB secretary of need to convene a ~~PRC~~ ESRB meeting.

2. Present results of the panel assessments to the appropriate ~~PRC~~ESRB.

Plant Review Committee

3. Dictate any additional actions, including declaration of a previously undeclared "assumed leaker."

   The following guidelines are used to qualify as an "assumed leaker":

   - The posterior probability from the assessments of the leaker hypothesis is greater than .5, and

   - The combined likelihood ratio favors the leaker hypothesis (i.e., is greater than 1.0).

   The ~~PRC~~ ESRB review of the tank leak assessment process and documentation of ~~PRC~~ ESRB decisions will be performed in accordance with TFC-CHARTER-10.

4.2.8 Prepare Final Assessment Report

Assessment Coordinator

1. Prepare final assessment report with review and concurrence by the other participants as an update of the preliminary assessment report based on the workshop to revise/reconcile assessments. The final report is to be approved by the Process Analysis director.

   This report shall include the final ~~PRC~~ ESRB decision and shall be released as an engineering document per the requirements of ~~HNF-IP-0842, Volume 4, Section 3.5~~TFC-ENG-DESIGN-C-25, for tracking and retrieval purposes. Ensure that ORP is on final distribution.

4.2.9 Reports and Documentation

- Preliminary Assessment Report - prepared by the tank leak assessment coordinator to include the specific probabilistic assessments of the analysts, the technical rationales for these assessments, the probability of the tank being a leaker based on these assessments, and the significant differences and the apparent reasons for these differences among the analysts. It is a "working document" provided to the analysts prior to the revision/reconciliation workshop, and may also be provided to the ~~PRC~~ ESRB members prior to their decision.

- Final Assessment Report - prepared by the tank leak assessment coordinator with review and concurrence by the other participants as an update of the Preliminary Assessment Report based on the workshop to revise/reconcile assessments. This report shall include the final ~~PRC~~ ESRB decision and shall be released as an engineering document for tracking and retrieval purposes.

- Following a decision by the ~~PRC~~ ESRB to change the official tank status as reported in HNF-EP-0182, "Waste Tank Summary Report," (Hanlon Report), the Waste Tank Summary Report shall be modified per the requirements of TFC-ENG-CHEM-D-22 to reflect the new status and the final assessment report shall be referenced.

5.0 DEFINITIONS

Data element. Specific information from a particular source that may be relevant to tank leak determination. Generally, data elements will include surface liquid level, liquid observation well measurements, gross gamma logs from drywells and laterals, data from leak detection pits, and spectral gamma logs.

Ex-tank measures. Leak monitoring data from measures taken outside the tank, i.e., from drywells, leak detection pits, and laterals.

Gross gamma logs. Measures of the change in radioactivity in the soil over time based on total gamma counts in specific reference intervals.

Hypotheses. Possible explanations for observed data. Generally, one hypothesis considered will be that the tank has leaked or is leaking. In most cases, one or more non-leak hypotheses will also be developed and considered.

Initiating data. Data from leak monitoring or other sources (e.g., spectral gamma logging) that exceed specified requirements, thus initiating further required actions.

In-tank measures. Leak monitoring data from measures taken inside the tank, i.e., surface liquid level and interstitial liquid level.

Likelihood ratio. The ratio of two probabilities that specifies the relative chance that specific data (e.g., changes in surface liquid level) are the result of one hypothesis (e.g., tank has leaked) versus another (e.g., season/weather variation).

Preliminary determination. The process for determining whether initiating data can be explained with an acceptable degree of certainty by some operations or processes other than the tank leaking.

Prior probability. The probability that a tank has leaked or is leaking before initiating data are available.

Probability. A measure of the state of knowledge or belief about the likelihood that a specific state of nature (e.g., a tank has leaked or is leaking) is true. Probability must be between 0 (absolute certainty that the state of nature is not true) and 1 (absolute certainty that the state of nature is true).

Spectral gamma logs. Measures of the concentration of individual gamma-ray-emitting radionuclides in the sediments surrounding drywells.

6.0 RECORDS

The following records are generated during the performance of this guidance document:

- Final Assessment Report.

The DST System Engineering manager is responsible for record retention and retirement in accordance with TFC-BSM-IRM_DC-C-02.

7.0 REFERENCES

1. HNF-3747, "Tank Leak Assessment Technical Background."
2. MAC-HGLP 1.8.1, "Hanford Tank Farms Vadose Zone Monitoring Project, Baseline Monitoring Plan."
3. OSD-T-151-00031, "Operating Specifications for Tank Farm Leak Detection and Single Shell Tank Intrusion Detection."
4. RPP-16922, "Environmental Specification Requirements."
5. "Statistical Decision Theory and Bayesian Analysis," Second Edition, 1985, J. O. Berger, Springer-Verlag, New York, New York.
6. TFC-BSM-AD-C-01, "Administrative Document Development and Maintenance."

Figure 1. Example of Categorization of In-Tank Data.

SURFACE LEVEL MEASUREMENTS

ENRAF

Mark Best Choice, Y/N/NA

Unexplained, repeatable drop>tolerance	Yes	No	NA
Significant drop	Yes	No	NA
Significant trend change	Yes	No	NA

FIC

Unexplained, repeatable drop>tolerance	Yes	No	NA
Significant drop	Yes	No	NA
Significant trend change	Yes	No	NA

M.T.

Unexplained, repeatable drop>tolerance	Yes	No	NA
Significant drop	Yes	No	NA
Significant trend change	Yes	No	NA

LOW MEASUREMENTS

Unexplained, repeatable drop>tolerance	Yes	No	NA
Significant drop	Yes	No	NA
Significant trend change	Yes	No	NA

CORROBORATING EVIDENCE

Thermocouple	Leak	Other	NA
Salt well screen	Leak	Other	NA
SHMS	Leak	Other	NA
Photos/Videos	Leak	Other	NA
Weather (e.g., bar. pressure, precipitation, temperature)	Leak	Other	NA
Process History	Leak	Other	NA
Drywell drilling logs	Leak	Other	NA
Occurrence reports	Leak	Other	NA
Construction history	Leak	Other	NA
GREs	Leak	Other	NA
Equipment maintenance calibration	Leak	Other	NA
Waste characterstics	Leak	Other	NA
In-tank operations (e.g., core samples, equipment installation, etc.)	Leak	Other	NA
Intrusion and Ventilation Information	Leak	Other	NA
Other (specify)	Leak	Other	NA

Figure 2. Example of Categorization of Ex-Tank Data.

SPECTRAL GAMMA LOGS Mark Best Choice

Radionuclides			
Man-made?	Yes	No	NA
Multiple?	Yes	No	NA
Distribution			
Peak at bottom of tank?	actual data		No or NA
Peak near surface?	actual data		No or NA
Increased activity in between?	actual data		No or NA
Increased activity below tank?	actual data		No or NA
Activity across boreholes			
Multiple boreholes?	Yes	No	NA
Consistent across boreholes?	Yes	No	NA
Activity over time			
Increased activity?	Yes	No	NA

HISTORICAL GROSS GAMMA LOGS

Distribution			
Sign. peak at bottom of tank?	actual data		No or NA
Sign. peak near surface?	actual data		No or NA
Sign. increased activity in between?	actual data		No or NA
Sign. increased activity below tank?	actual data		No or NA
Activity across boreholes			
Multiple boreholes?	Yes	No	NA
Consistent across boreholes?	Yes	No	NA
Activity over time			
Abrupt increase (bottom)?	Yes	No	NA
Abrupt increase (elsewhere)?	Yes	No	NA
Gradual increase (bottom)?	Yes	No	NA
Gradual increase (elsewhere)?	Yes	No	NA

CORROBORATIVE EVIDENCE

Moisture Probe	Leak	Other	NA
Psychrometrics	Leak	Other	NA
Bore Hole Core Sample	Leak	Other	NA
Laterals	Leak	Other	NA
Weather	Leak	Other	NA
Process History	Leak	Other	NA
Drywell drilling logs	Leak	Other	NA
Occurrence reports	Leak	Other	NA
Construction history	Leak	Other	NA
GREs	Leak	Other	NA
Equipment maintenance calibration	Leak	Other	NA
Waste characterstics	Leak	Other	NA
In-tank operations	Leak	Other	NA
Equipment failure	Leak	Other	NA
Other (specify)	Leak	Other	NA

Figure 3. Example of Elicitation Form and Formulas.

Hypotheses:

Leaker ______________________________

Non-Leaker ______________________________

____

____

		True State L	True State NL	Liklihood Ratio (L:NL)
Prior Probability				
Cond. Probabilities				
In Tank	SLD	____	____	____
	LOW	____	____	____
	SLD|LOW	____	____	____
	LOW|SLD			
Ex tank	GGL	____	____	____
	SGL	____	____	____
	GGL|SGL	____	____	____
	SGL|GGL			
Combined	In	____	____	____
	Ex	____	____	____
	In|Ex	____	____	____
	Ex|In			
Combined Liklihood Ratio				
Posterior Probability				
	Calculated	____	____	____
	Assessed			

Notes: Shaded entries are calculated
SLD: Surface Level Drop Data
LOW: Liquid Observation Well Data
GGL: Gross Gamma Count Data
SLG: Spectral Gamma Count Data

Figure 3. Example of Elicitation Form and Formulas. (cont.)

Notes:

For a clear answer to the probability, the leak assessment coordinator should ask for only one set of data each for the in-tank and ex-tank evaluations.

Specifically, for in-tank evaluation use only one of the pairs, SLD and LOW | SLD (read as LOW given SLD), or LOW and SLD | LOW.

Similarly, for ex-tank evaluation, use only one of the pairs, GGL and SGL | GGL or SGL and GGL | SGL.

If P(In) and P(Ex) are determined to be independent, then, P(Combined)=P(In)*P(Ex), and the conditional probabilities in this section are not needed. If the probabilities are dependent, then either P(Combined)= P(In)*P(Ex | In), or P(Combined) = P(Ex)*P(In | Ex), but not both.

The highlighted blanks in Table 3 are calculated using Baye's rule as described above. (Reference: *Statistical Decision Theory and Bayesian Analysis*, Second Edition, 1985, Springer-Verlag, New York, New York).

Enclosure 2
06-TOD-069

"Operating Specifications for Tank Farm Leak Detection and Single-Shell Tank Intrusion Detection" OSD-T-151-00031, Revision G-2

(26 pages total, including coversheet)

OSD-T-151-00031
Revision G-2

OPERATING SPECIFICATIONS FOR TANK FARM LEAK DETECTION AND SINGLE –SHELL TANK INTRUSION DETECTION

D. A. Barnes
CH2M Hill Hanford

Date Published
June 2006

CH2MHILL
Hanford Group, Inc.

Post Office Box 1500
Richland, Washington

Prepared for the U.S. Department of Energy
Office of River Protection

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Table of Contents

TABLES

1.0 INTRODUCTION

1.1 Purpose and Scope

Operating Specifications are technical limits which are set on a process to prevent injury to personnel, or damage to the facility or environment. The main purpose of this document is to provide specification limits and recovery actions for the 200 Area Leak and Intrusion Detection Surveillance Program at the Hanford Site. This document provides requirements for single-shell tanks (SSTs), double-shell tanks (DSTs), and catch tank/receiver tanks. Specification limits are given for monitoring frequencies and permissible variation of readings from an established baseline or previous reading. Most of the leak detection and intrusion detection requirements in this document are driven by environmental considerations and data analysis issues, rather than facility design or personnel safety issues.

This document is applicable to all SST and DST waste tanks, and the associated catch tanks and receiver tanks listed in Tables 4.1 and 4.2.

The document "Single-Shell Tank System Leak Detection and Monitoring Functions and Requirements Document", RPP-9937, Rev. 2, was approved for implementation in April, 2006. The initial release of this primary TPA document in 2003 significantly altered the basic requirements for leak and intrusion monitoring in SSTs. Prior to this document the core assumption was that Leak Detection Monitoring (LDM) was legally required in all SSTs per RCRA, and would be performed wherever feasible, (within the limits of the available technology and installed equipment). This core assumption drove all revisions of this OSD prior to Rev F-0, and is described in more detail in WHC-SD-WM-TI-573 and RPP-9645. The release of RPP-9937 changed this core assumption for many of the SSTs.

RPP-9937 divides the 149 SSTs into two primary groups: those that require routine Leak Detection Monitoring (LDM) and those that do not. For the tanks that now require LDM, the original leak detection logic described in WHC-SD-WM-TI-573 and RPP-9645 is still applicable. For the remaining tanks that no longer require LDM, the TPA requirement is either a weekly or annual reading to verify that intrusion is not occurring, (either surface level or LOW, depending on equipment available). The frequency is determined by the remaining total drainable interstitial liquid (TDIL) and whether intrusion prevention (IP) has been completed on the tank.

An expanded discussion of the current LDM and intrusion logic can be found in the latest revision of RPP-9937.

1.2 Application of Limits

Specification limits are provided for monitoring frequencies and permissible deviations of readings from an established baseline or previous reading. This document is divided into separate sections for SST leak and intrusion detection, DST leak detection, and catch/receiver tank leak and intrusion detection. Each section lists the required response and actions to be followed when a specification limit is exceeded and what constitutes a violation of this Operating Specification Document (OSD). For SSTs, the required measurement device for leak and intrusion detection is specified for each tank, where available. Pre-approved ALTERNATE measurement devices are also specified for SSTs, catch tanks, and receiver tanks, which can be used if the designated device is out of service.

Specification limits are given at the front of each section. The Technical Basis section provides a summary of the reasoning used to derive the specification limits, and may refer to other supporting documents. The Detection/Control section describes general practices and programs in place that can provide effective monitoring for compliance to the specification limits. Statements in this section only describe how compliance monitoring is typically performed, but they are informational only, and do not contain requirements. Finally, the Recovery Action section defines the actions to be taken if a required reading is not obtained for a variety of reasons, or an OSD violation occurs.

1.3 Frequency Definitions

For this OSD, the definition of a monitoring frequency of "daily" means at least once in the period from 00:00 hours to 23:59 hours each day. There shall be a minimum of 8 hours between successive readings.

For this OSD, the definition of a monitoring frequency of "weekly" means at least once in the period from 00:00 hours on Monday through 23:59 hours on the following Sunday. There shall be a minimum of 48 hours between successive readings.

For this OSD, the definition of a monitoring frequency of "monthly" means at least once in the period from 00:00 hours on the 1st day of each month to 23:59 hours on the last day of the same month. There shall be a minimum of 7 days between successive readings.

For this OSD, the definition of a monitoring frequency of "quarterly" means at least once in each of the periods from 00:00 hours on January 1 through 23:59 hours on March 31, 00:00 hours April 1 through 23:59 on June 30, 00:00 hours on July 1 through 23:59 on September 30, and 00:00 hours on October 1 through 23:59 hours on December 31. There shall be a minimum of 31 days between successive readings.

For this OSD, the definition of a monitoring frequency of "yearly" or "annual" means at least once in the period from 00:00 hours on January 1 to 23:59 hours on December 31 of the same calendar year. There shall be a minimum of 90 days between successive readings.

The current revision of RPP-9937, (the TPA Functions and Requirements document), does not allow for any "grace period" or "extension" if the frequency defined above is exceeded.

1.4 Definitions and Acronyms

PRIMARY Monitoring Device – A primary detection monitoring device for a single-shell tank is the instrument most capable of identifying a leak or intrusion with the highest level of confidence. PRIMARY devices, where required, are specified for each tank in this Operating Specification Document.

ALTERNATE - Alternate monitoring devices are those which may be used in place of a PRIMARY monitoring device to provide a similar or equivalent reading. An example is using a zip cord or manual tape as an ALTERNATE to an ENRAF™ reading. In most cases, an ALTERNATE device is not permanently installed on the tank and may be removed when not needed.

INTRUSION DETECTION - Intrusion detection for single-shell tanks is performed by monitoring for increases in the tank surface level or interstitial liquid level.

TREND LINE - A baseline liquid level for a tank that allows for a naturally occurring decreasing or increasing trend. The changes are normally due to evaporation or condensation, but may also be due to physical changes with the waste or temperature effects. The historical trend of the level measurements for the tank are statistically evaluated to determine a least-squares fit through the data set.

RETRIEVAL STATUS – A tank is considered to be officially in "retrieval status" if one of two conditions are met: either waste has been physically removed from the tank by retrieval operations or, preparations for retrieval operations are directly responsible for rendering the instrument "out of service" per the definition below.

SPECIFICATION LIMIT - Specification limits are limits set on leak and intrusion detection or survey methods which must be adhered to. Specification limits on data measurements are those which set an action point for when a value is considered abnormally low or high, triggering further investigation. Specification limits on data measurement frequencies are the maximum time limits permitted between successive measurements.

VERIFIED READING - A verified reading refers to a reading outside the listed specification limits for a tank, which has been re-measured to verify it is beyond established specification limits, is repeatable, and is reliable.

OUT OF SERVICE - A device being unavailable due to electrical or mechanical failure of the device itself, or lack of a required support system, (e.g., electrical power or instrument air), or equipment being inaccessible due to nearby activities. This can be due to either planned and/or scheduled outages, unplanned failures, or natural disasters.

1.4 Definitions and Acronyms (Cont.)

Acronyms

CAM -	Continuous Air Monitor
DCRT -	Double Contained Receiver Tank
DST -	Double-Shell Tank
ILL -	Interstitial Liquid Level
LOW -	Liquid Observation Well
MT -	Manual Tape
NA –	Not Applicable
OSD -	Operating Specifications Document
RCRA -	Resource Conservation and Recovery Act
SACS –	Surveillance Analysis Computer System
SST -	Single-Shell Tank
TMACS –	Tank Monitor and Control System
TPA -	Tri Party Agreement
TS & DA -	Tank Surveillance and Data Acquisition
WDOE –	State of Washington Department of Ecology, also referred to as "Ecology"

2.0 SINGLE-SHELL TANK LEAK AND INTRUSION DETECTION SPECIFICATIONS

According to RPP-9937, routine LDM is required if a tank exceeds the maximum remaining liquid volume criteria, and LDM is also technically feasible. If a tank is exempt from LDM requirements it must still be monitored for intrusion. Table 2.3 specifies whether the tank is being monitored for LDM or intrusion, and all tanks in the table are subject to the requirements of this section. The required frequency is determined by the logic outlined in the latest version of RPP-9937.

Monitoring requirements in this OSD are applicable during the waste storage function until the start of retrieval operations, and after completion of retrieval operations. This OSD is not applicable during active retrieval operations or during closure operations. (See definition of "Retrieval Status" in "DEFINITIONS" section of this document.) Monitoring requirements during retrieval operations will be addressed by the tank-specific retrieval documents. Table 2.1 and Table 2.2 list the specification limits for leak and intrusion detection, and Table 2.3 lists the PRIMARY monitoring method for each tank and the applicable frequency. Acceptable pre-approved ALTERNATE measurement devices are given in the Detection/Control section.

SST leak and intrusion detection specification limits are given for each monitoring method. The specification limits for each detection or survey method are applicable only to that specific leak detection or survey method, and only under the conditions specified. WHC-SD-WM-TI-573, Section 4.0 provides the basis for selection of the PRIMARY leak detection or survey methods.

For tanks containing less than 40 thousand gallons of liquid RPP-9937 requires one annual measurement to verify that an intrusion is not occurring, (either a LOW or surface level, depending on equipment installed). One data point per year cannot be analyzed using the normal "baseline and tolerance" trending techniques due to insufficient data. (One reading per year does not provide a statistically valid number of measurements.) Operations management has agreed to obtain the intrusion readings in Table 2.3 quarterly in an effort to identify significant intrusions in a more timely manner.

Table 2-1 Detection Specification Limits

Variable	Specification Limit
Interstitial Liquid Level (ILL) with established trend baseline	+/-3 standard deviations (σ) from trend baseline, or –1.2 inches, whichever is larger
New Interstitial Liquid Level (ILL) without established trend baseline	+/-3.6 inches from the reference baseline
Surface Level Device (ENRAF^{TM}, MT, or Zip Cord)	See Table 2-2 (Below)

2.0 SINGLE-SHELL TANK LEAK AND INTRUSION DETECTION SPECIFICATIONS (CONT.)

Table 2-2 Surface Level Device Detection Specification Limits

Device	Assumed Waste Surface				
	Liquid, No Seasonal Variation	Liquid with Seasonal Variation	Partial Liquid	Slurry	Dry
ENRAF	+/-0.5 in.	+/-1.0 in.	+/-1.0 in.	+/-3.0 in.	NA
Manual Tape	+/-1.0 in.	+/-1.0 in.	+/-2.0 in.	+/-3.0 in.	NA
Zip Cord	+/-1.0 in.	+/-1.0 in.	+/-2.0 in.	+/-3.0 in.	NA

For all surface level devices specified as PRIMARY monitoring device in Table 2.3, refer to Table 2.2 above for the Specification Limit. The increase and decrease values listed represent the maximum allowable deviation from the established baseline for that device. Since most tanks require quarterly readings, any tanks requiring weekly readings have been highlighted.

Table 2-3 Single-Shell Tank Monitoring Device and Frequency (4 pages)

Tank	Primary Monitoring Device	Monitoring Frequency	Specification Limit	LDM or Intrusion
A-101	LOW	Quarterly	ILLSL	Intrusion
A-102	Enraf	Quarterly	+3.0 in	Intrusion
A-103	LOW	Quarterly	ILLSL	LDM
A-104	ENRAF	Quarterly	+3.0 in.	Intrusion
A-105	ENRAF	Quarterly	+3.0 in.	Intrusion
A-106	LOW	Quarterly	ILLSL	Intrusion
AX-101	LOW	Quarterly	ILLSL	Intrusion
AX-102	ENRAF	Quarterly	+3.0 in.	Intrusion
AX-103	LOW	Quarterly	ILLSL	Intrusion
AX-104	ENRAF	Quarterly	+3.0 in.	Intrusion
B-101	LOW	Quarterly	ILLSL	Intrusion
B-102	ENRAF	Quarterly	+1.0 in.	Intrusion
B-103	ENRAF	Quarterly	+3.0 in.	Intrusion
B-104	LOW	Quarterly	ILLSL	Intrusion
B-105	LOW	Quarterly	ILLSL	Intrusion
B-106	ENRAF	Quarterly	+3.0 in.	Intrusion
B-107	LOW	Quarterly	ILLSL	Intrusion
B-108	LOW	Quarterly	ILLSL	Intrusion
B-109	LOW	Quarterly	ILLSL	Intrusion
B-110	LOW	Quarterly	ILLSL	Intrusion
B-111	LOW	Quarterly	ILLSL	Intrusion
B-112	ENRAF	Quarterly	+1.0 in.	Intrusion
B-201	ENRAF	Quarterly	+3.0 in.	Intrusion
B-202	ENRAF	Quarterly	+3.0 in.	Intrusion
B-203	ENRAF	Quarterly	+3.0 in.	Intrusion
B-204	ENRAF	Quarterly	+3.0 in.	Intrusion
BX-101	ENRAF	Quarterly	+1.0 in.	Intrusion

Tank	Primary Monitoring Device	Monitoring Frequency	Specification Limit	LDM or Intrusion
BX-102	ENRAF	Quarterly	+3.0 in.	Intrusion
BX-103	ENRAF	Quarterly	-1.0 in.	LDM
BX-104	ENRAF	Quarterly	+3.0 in.	Intrusion
BX-105	ENRAF	Quarterly	+3.0 in.	Intrusion
BX-106	ENRAF	Quarterly	+3.0 in.	Intrusion
BX-107	ENRAF	Quarterly	+1.0 in.	Intrusion
BX-108	ENRAF	Quarterly	+3.0 in.	Intrusion
BX-109	LOW	Quarterly	ILLSL	Intrusion
BX-110	LOW	Quarterly	ILLSL	Intrusion
BX-111	LOW	Quarterly	ILLSL	Intrusion
BX-112	ENRAF	Quarterly	+3.0 in.	Intrusion
BY-101	LOW	Quarterly	ILLSL	Intrusion
BY-102	LOW	Quarterly	ILLSL	Intrusion
BY-103	LOW	Quarterly	ILLSL	LDM
BY-104	LOW	Quarterly	ILLSL	Intrusion
BY-105	LOW	Quarterly	ILLSL	Intrusion
BY-106	LOW	Quarterly	ILLSL	Intrusion
BY-107	LOW	Quarterly	ILLSL	Intrusion
BY-108	LOW	Quarterly	ILLSL	Intrusion
BY-109	LOW	Quarterly	ILLSL	Intrusion
BY-110	LOW	Quarterly	ILLSL	Intrusion
BY-111	LOW	Quarterly	ILLSL	Intrusion
BY-112	LOW	Quarterly	ILLSL	Intrusion
C-101	ENRAF	Quarterly	+3.0 in.	Intrusion
C-102	ENRAF	Quarterly	+3.0 in.	LDM
C103	ENRAF	Quarterly	+3.0 in.	Intrusion
C-104	ENRAF	Quarterly	+3.0 in.	Intrusion
C-105	ENRAF	Quarterly	+3.0 in.	Intrusion
C-106	ENRAF	Quarterly	+3.0 in.	Intrusion
C-107	ENRAF	Quarterly	+3.0 in.	Intrusion
C-108	ENRAF	Quarterly	+3.0 in.	Intrusion
C-109	ENRAF	Quarterly	+3.0 in.	Intrusion
C-110	ENRAF	Quarterly	+3.0 in.	Intrusion
C-111	ENRAF	Quarterly	+3.0 in.	Intrusion
C-112	ENRAF	Quarterly	+3.0 in.	Intrusion
C-201	MT	Quarterly	+3.0 in.	Intrusion
C-202	ENRAF	Quarterly	+3.0 in.	Intrusion
C-203	ENRAF	Quarterly	+3.0 in.	Intrusion
C-204	MT	Quarterly	+3.0 in.	Intrusion
S-101	LOW	Quarterly	ILLSL	Intrusion
S-102	ENRAF	Weekly	-1.0 in.	Intrusion
S-103	LOW	Quarterly	ILLSL	Intrusion
S-104	LOW	Quarterly	ILLSL	Intrusion
S-105	LOW	Quarterly	ILLSL	Intrusion
S-106	LOW	Quarterly	ILLSL	Intrusion
S-107	LOW	Quarterly	ILLSL	Intrusion
S-108	LOW	Quarterly	ILLSL	Intrusion
S-109	LOW	Quarterly	ILLSL	Intrusion
S-110	LOW	Quarterly	ILLSL	Intrusion
S-111	LOW	Quarterly	ILLSL	Intrusion
S-112	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-101	LOW	Quarterly	ILLSL	Intrusion

Tank	Primary Monitoring Device	Monitoring Frequency	Specification Limit	LDM or Intrusion
SX-102	LOW	Quarterly	ILLSL	Intrusion
SX-103	LOW	Quarterly	ILLSL	Intrusion
SX-104	LOW	Quarterly	ILLSL	Intrusion
SX-105	LOW	Quarterly	ILLSL	Intrusion
SX-106	LOW	Quarterly	ILLSL	Intrusion
SX-107	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-108	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-109	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-110	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-111	LOW	Quarterly	ILLSL	Intrusion
SX-112	LOW	Quarterly	ILLSL	Intrusion
SX-113	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-114	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-115	ENRAF	Quarterly	+3.0 in.	Intrusion
T-101	LOW	Quarterly	ILLSL	Intrusion
T-102	ENRAF	Quarterly	-1.0 in.	LDM
T-103	ENRAF	Quarterly	+3.0 in.	Intrusion
T-104	LOW	Quarterly	ILLSL	Intrusion
T-105	ENRAF	Quarterly	+3.0 in.	Intrusion
T-106	ENRAF	Quarterly	+3.0 in.	Intrusion
T-107	ENRAF	Quarterly	+1.0 in.	Intrusion
T-108	ENRAF	Quarterly	+1.0 in.	Intrusion
T-109	LOW	Quarterly	ILLSL	Intrusion
T-110	LOW	Quarterly	ILLSL	Intrusion
T-111	LOW	Quarterly	ILLSL	Intrusion
T-112	ENRAF	Quarterly	-1.0 in.	LDM
T-201	ENRAF	Quarterly	+1.0 in.	Intrusion
T-202	ENRAF	Quarterly	+1.0 in.	Intrusion
T-203	ENRAF	Quarterly	+3.0 in.	Intrusion
T-204	ENRAF	Quarterly	+1.0 in.	Intrusion
TX-101	ENRAF	Quarterly	+1.0 in.	Intrusion
TX-102	LOW	Quarterly	ILLSL	Intrusion
TX-103	LOW	Quarterly	ILLSL	Intrusion
TX-104	LOW	Quarterly	ILLSL	Intrusion
TX-105	LOW	Quarterly	ILLSL	Intrusion
TX-106	LOW	Quarterly	ILLSL	Intrusion
TX-107	ENRAF	Quarterly	+3.0 in.	Intrusion
TX-108	ENRAF	Quarterly	+3.0 in.	Intrusion
TX-109	LOW	Quarterly	ILLSL	Intrusion
TX-110	LOW	Quarterly	ILLSL	Intrusion
TX-111	LOW	Quarterly	ILLSL	Intrusion
TX-112	LOW	Quarterly	ILLSL	Intrusion
TX-113	LOW	Quarterly	ILLSL	Intrusion
TX-114	LOW	Quarterly	ILLSL	Intrusion
TX-115	LOW	Quarterly	ILLSL	Intrusion
TX-116	LOW	Quarterly	ILLSL	Intrusion
TX-117	LOW	Quarterly	ILLSL	Intrusion
TX-118	LOW	Quarterly	ILLSL	Intrusion
TY-101	ENRAF	Quarterly	+3.0 in.	Intrusion
TY-102	ENRAF	Quarterly	+1.0 in.	Intrusion
TY-103	LOW	Quarterly	ILLSL	Intrusion
TY-104	ENRAF	Quarterly	+1.0 in.	Intrusion

Tank	Primary Monitoring Device	Monitoring Frequency	Specification Limit	LDM or Intrusion
TY-105	LOW	Quarterly	ILLSL	Intrusion
TY-106	ENRAF	Quarterly	+3.0 in.	Intrusion
U-101	ENRAF	Quarterly	+1.0 in.	Intrusion
U-102	LOW	Quarterly	ILLSL	Intrusion
U-103	LOW	Quarterly	ILLSL	Intrusion
U-104	ENRAF	Quarterly	+3.0 in.	Intrusion
U-105	LOW	Quarterly	ILLSL	Intrusion
U-106	LOW	Quarterly	ILLSL	Intrusion
U-107	LOW	Quarterly	ILLSL	Intrusion
U-108	LOW	Quarterly	ILLSL	Intrusion
U-109	LOW	Quarterly	ILLSL	Intrusion
U-110	LOW	Quarterly	ILLSL	Intrusion
U-111	LOW	Quarterly	ILLSL	Intrusion
U-112	MT	Quarterly	+3.0 in.	Intrusion
U-201	MT	Quarterly	+2.0 in.	Intrusion
U-202	MT	Quarterly	+2.0 in.	Intrusion
U-203	ENRAF	Quarterly	+3.0 in.	Intrusion
U-204	ENRAF	Quarterly	+1.0 in.	Intrusion

Legend for Table 2.3

1. Primary Leak and Intrusion Detection

   LOW – Liquid Observation Well
   ENRAF – ENRAF™ displacer-type surface level gauge
   MT – Manual Tape

2. ILLSL - Interstitial Liquid Level Specification Limit

3. A tank may change monitoring status due to saltwell pumping, transfer, retrieval operations, or closure operations. This may lead to a situation where the device and frequency specified in Table 2.3 are no longer applicable. The new tank status will be evaluated based on the requirements in RPP-9937, and the resulting monitoring requirements shall be implemented as soon as practical. This OSD will be updated regularly to reflect tank status changes.

2.0 SINGLE-SHELL TANK LEAK AND INTRUSION DETECTION SPECIFICATIONS (CONT.)

Technical Basis: According to RPP-9937, two key considerations dictate whether or not a tank requires Leak Detection Monitoring (LDM). First, is LDM technically feasible, i.e., can a leak be monitored with currently available instrumentation? Second, does the tank meet Interim Stabilization (IS) criteria? The IS criteria are less than 50 kgal total drainable liquid, and less than 5 kgal supernatant. Any tank that is technically capable of LDM which fails to meet the IS criteria is required to be monitored for leaks (LDM). Additionally, if a tank meets the IS criteria, but has not completed intrusion prevention (IP), and has 40 kgal or more of total drainable liquid there is a risk that it may exceed the 50 kgal criteria if there is an intrusion. These tanks require weekly monitoring for intrusion.

To determine if leak detection monitoring (LDM) is technically feasible or not the following logic is used. If a waste surface is fluid enough to register a decrease in response to a leak, (either liquid, partial liquid, or slurry surface), then the surface level gauge can be used to detect a leak and is the preferred device. If the surface is dry or solid and would not decrease in response to a leak, then the only leak detection available is the LOW. A LOW can be installed and effectively monitor for a leak if there is more than 24 inches of total waste and greater than 5 kgal of total drainable liquid. Tanks meeting this criteria already have a LOW installed. If the tank has a dry surface and a LOW is not feasible based on the criteria just cited, no leak detection capability is claimed, and RPP-9937 only requires intrusion monitoring. See WHC-SD-WM-TI-573, RPP-9645, and RPP-9937 for expanded discussions.

Derivation of the specification limits, their application to each type of baseline, monitoring frequencies and additional information on their technical basis can be found in WHC-SD-WM-TI-573.

Detection/Control: Table 2.3 lists the PRIMARY means of leak and intrusion detection for each SST, and the required monitoring frequency and specification limit. Pre-approved ALTERNATE devices for surface level measurement are ENRAF, FIC, Manual Tape, Zip Cord, and Weight Factor. Pre-approved ALTERNATE devices for a LOW include weight factor readings taken in the saltwell screen and surface level devices in a stilling well or flooded LOW. Additional ALTERNATE devices not specifically mentioned above can be used if they are approved by a letter from the WFO System Engineering Manager.

For surface level measurements, whether a tank is assumed to have a liquid, partial liquid, slurry, or dry surface is determined by the surveillance lead engineer in the WFO System Engineering group. Tanks exhibiting significant seasonal level reading variations are determined by the surveillance lead engineer in the WFO System Engineering group.

Baselines are prepared and approved following the guidelines in TFC-ENG-CHEM-D-19. Reference baselines, trend baselines, and all temporary zip cord, dip tube or other baselines are established by the WFO System Engineering group. The permissible surface level increase and decrease values (whether based on standard deviation or a fixed value) are determined from Table 2.2 and incorporated into the Surveillance Analysis Computer System (SACS), Tank

2.0 SINGLE-SHELL TANK LEAK AND INTRUSION DETECTION SPECIFICATIONS (CONT.)

Monitoring and Control System (TMACS) and/or appropriate round sheets, data sheets or other approved documentation.

Surface level data is gathered in accordance with procedures TO-040-180, applicable round sheets or other approved documentation. Scans of LOWs are acquired in accordance with procedure TO-040-333, or other approved documentation. Data from dip tube or zip cord measurements are recorded on round sheets, data sheets or other approved documentation as directed by the Closure Projects Shift Manager. WFO System Engineering personnel analyze the data for compliance to the frequency requirements and specification limits contained in this document.

Specification limits given in Table 2.2 DO NOT apply to ALTERNATE devices as long as the PRIMARY device is operational. Specification limits DO apply to any ALTERNATE device that is used in place of a PRIMARY device.

The remaining Manual Tape gauges are in the process of being replaced with a displacer-type gauge manufactured by the ENRAF Corporation. ENRAF displacer-type level gauges may be substituted for Manual Tapes whenever they are used as PRIMARY or ALTERNATE leak detection devices. The limit specified in Table 2.2 is applied for whichever device is being used.

Each LOW will have a probe type designated as "primary". All other probe types are considered "secondary". The specification limit always applies to the primary probe. The specification limit will not be applied to the secondary probe unless a valid baseline has been established for that probe.

Recovery Action: The section below describes what does and does not constitute an OSD violation. It also describes actions to be taken if specified monitoring equipment is out-of-service. If the actions specified are taken within the allowable time period, no OSD violation will occur.

WARNING - With the acceptance of RPP-9937 as a primary TPA document the consequences of an OSD violation have increased significantly. Failure to obtain data specified in this OSD may also violate TPA requirements. Also, the frequency definitions have been altered to eliminate the previous grace periods. RPP-9937 does not allow for time extensions.

Obtaining or reporting data that exceeds a specification limit for a liquid level or LOW reading is not an OSD violation. Both surface level and Interstitial Liquid Level (ILL) measurements can be subject to substantial deviations due to changes in barometric pressure. In the case of a significant barometric response, raw data should be corrected for barometric effects prior to determining whether or not a measurement has exceeded a specification limit. For all verified corrected data that exceeds the specification limits established in this document, the process outlined in TFC-CHEM-D-42, "Tank Leak Assessment Process" shall be followed.

2.0 SINGLE-SHELL TANK LEAK AND INTRUSION DETECTION SPECIFICATIONS (CONT.)

Deferral of required readings for up to 72 hours is permitted when the safety of personnel or performance of equipment will be adversely affected by weather or other conditions. (Examples: heavy snow fall or dust storms severe enough to compromise safety.) The deferral of required data is to be documented on a Problem Evaluation Request (PER). No additional deferral is allowed until a valid reading has been obtained.

If a required reading is not obtained for any reason other than the 72-hour personnel safety deferral, a PER (TUF) shall be issued within 4 working days of the required frequency being exceeded. The PER shall include a corrective plan developed with the concurrence of the WFO System Engineering Manager, the appropriate WFO or CO Operations Manager, and the Environmental Support and Assessment Program Manager. This corrective plan shall contain a commitment date for resolving the problem and completing all actions required to be in full compliance with the OSD. Ecology shall be notified per the requirements in TFC-ENG-ENV_FS-C-01, "Environmental Notifications". Missing a required reading and committing to a corrective plan is not an OSD violation. If the commitment date in the corrective plan is exceeded without achieving OSD compliance, an OSD violation will occur.

If an OSD violation occurs, Operations Management shall issue a new PER declaring the violation within one working day. The appropriate recovery shall be determined by the PER assignee and the recovery actions documented in the PER resolution. Ecology shall be notified per the requirements in TFC-ENG-ENV_FS-C-01, "Environmental Notifications" and an Occurrence Report shall be issued if required by TFC-OPS-OPER-C-24, "Occurrence Reporting and Processing of Operations Information".

3.0 DOUBLE-SHELL TANK LEAK DETECTION SPECIFICATIONS

The technical basis for leak detection in the double-shell tank (DST) system is significantly different from that of the SST system. The annular space between the two shells is continuously monitored, and the presence of liquid or radionuclides in this space is considered evidence of a possible primary tank leak. Conductivity probes or ENRAF gauges are used to monitor for unexpected liquid increases, while the Annulus Continuous Air Monitor (CAM) can also used to monitor for airborne radionuclides. All 28 Hanford DSTs are subject to the requirements of this section.

The environmental leak detection requirements imposed by the State of Washington Department of Ecology, (Ecology), and those imposed by the Safety Basis (SB) are significantly different. If the SB requirements are being met it does not necessarily follow that the Ecology requirements are also being met. It is critical that both sets of requirements be fully understood and complied with.

Per the Settlement Agreement and Stipulated Order of Dismissal, (U.S. Department of Energy, et al. v. Ecology, PCHB No. 98-249; PCHB No. 98-250), referred to as "Settlement Agreement", each DST on the Hanford Site will be equipped and operated with a complete continuous Leak Detection System by December 31, 1999. A continuous Leak Detection System for each of the twenty eight (28) DSTs on the Hanford site shall be composed of three (3) operating annulus leak detector probes and at least one in-tank surface level monitor installed within the primary tank. The annulus leak detector probes shall be placed as equidistantly as possible within the annulus of each DST. Each adjustable annulus leak detector probe shall be set within 1/4 inch from the annulus floor with allowance for normal engineering tolerances. An annulus leak detector probe shall be a conductivity type probe, or equal or better device, (such as an ENRAF).

The Leak Detection System on each DST may not be replaced by, but may be supplemented by, the operation of an annulus ventilation system Continuous Air Monitor (CAM).

These requirements are summarized in Tables 3.1and Table 3.2.

3.0 DOUBLE-SHELL TANK LEAK DETECTION SPECIFICATIONS (CONT.)

Table 3-1 Required Leak Detection System (Ecology)

Variable	Category	Specification Limit
Three (3) Annulus Conductivity Probes (ENRAF gauges in the annulus may be substituted)	All DSTs	All annulus variable height conductivity probes shall be set at 0.25 inches from the annulus bottom, with a tolerance of +/- 0.25 inches (Full range equals 0.00 to 0.50 inches). * ENRAF gauges shall be set to alarm at 0.25 inches of liquid buildup. All unplanned annulus conductivity alarms or evidence of unexpected liquid in an annulus shall be investigated.
At least one (1) in-tank surface level monitor within the primary tank. (ENRAF, FIC, MT, or equivalent. Zip cord may be substituted in case of failure)	All DSTs	Surface level will be monitored daily

* See the Technical Basis Document, WHC-SD-TI-573, sections 6.1.1.1 and 6.2.2.3 for a discussion of the conductivity probe tolerance.

If the annulus ventilation system is being operated, Table 3-2 (below) shall apply.

Table 3-2 Supplement to Leak Detection System (Ecology)

Variable	Category	Specification Limit
Annulus CAM Radiation Level	All DSTs	Filter papers removed from an annulus CAM following a verified alarm shall be counted for long-life radionuclides. (Non-Radon) When the annulus vent system is operating, all DSTs equipped with operating annulus CAMs will be monitored daily for airborne releases into the annulus that could give an indication of a leak from the primary tank structure into the annulus. CAMs will be set to alarm at set points no greater than 3,000 counts per minute.

3.0 DOUBLE-SHELL TANK LEAK DETECTION SPECIFICATIONS (CONT.)

Technical Basis: The annulus conductivity probes respond to the presence of conductive liquid between the electrode and the annulus liner. The conductivity probe tolerance is discussed in Sections 6.1.1.1 and 6.2.2.3 of WHC-SD-WM-TI-573. In AY, AZ, and SY farms ENRAF gauges monitor for liquid buildup in the annulus. The presence of long-life radionuclides on the CAM filter paper is also an indication of potential primary tank leakage. The in-tank surface level gauge monitors the surface level in the primary tank.

Most of the specification limits in Tables 3.1 and Table 3.2 were derived directly from requirements contained in the Settlement Agreement. Since this was a legal directive, compliance is mandatory regardless of any supporting technical basis.

Detection/Control: Monitoring of annulus conductivity probe settings and annulus CAM operation and alarm response are described in procedure TO-040-590. Unexpected leak detection conductivity alarms will initiate an investigation by the Waste Feed Operations Shift Manager.

Radiation recorder readings from operating annulus CAMs are entered on routine tank farm data sheets.

Alarm setpoints for operating annulus CAMs are normally set by Radiological Protection personnel, and shall be set no greater than 3000 counts per minute. When a CAM alarms, the required response is provided in TO-040-590.

SETTLEMENT AGREEMENT REQUIREMENTS:

Per the requirements of the Settlement Agreement, all Leak Detection System devices comprising the Leak Detection System shall be maintained and operated continuously with the following exceptions:

1. Downtime for preventive maintenance and periodic functional testing shall not exceed twenty-four (24) hours.

2. Downtime for repair of a Leak Detection System device discovered to be inoperable or requiring repair shall not normally exceed ninety (90) days. Ecology must be notified of any leak detection device out-of-service for more than ninety (90) days.

3. All maintenance, repair, and functional testing activities of the Leak Detection System shall be documented in Hanford's operating record.

In the case of a planned facility shutdown, which will render the Leak Detection System inoperable for any period greater than 24 hours, Ecology must be notified. Any alternate leak detection requirements to be implemented during the outage must be documented in a letter from the Environmental Support and Assessment Program Manager to the Waste Feed Operations Director.

3.0 DOUBLE-SHELL TANK LEAK DETECTION SPECIFICATIONS (CONT.)

DSA REQUIREMENTS:

HNF-IP-1266, section 5.10 "Flammable Gas Controls", paragraph 3.C.1.a.1, states that Operations shall monitor the waste level in each DST (except 241-AY-102) every 7 days (not to exceed 8 days) to identify waste leaks to the annulus from the primary tank. For 241-AY-102 the frequency is increased to every 24 hours (not to exceed 30 hours). The data shall be compared with the previous reading. If an unexpected waste level decrease of 2 in. or greater is indicated, investigate for waste leaks to the annulus from the primary tank.

Annulus conductivity probes and annulus CAMs are considered "defense in depth" in the DSA. Surface level data is gathered in accordance with procedures TO-040-180, applicable round sheets or other approved documentation. Data from zip cord measurements are recorded on round sheets, or data sheets as directed by the WFO Shift Manager. WFO System Engineering personnel analyze the data for compliance to the frequency requirements and specification limits.

3.0 DOUBLE-SHELL TANK LEAK DETECTION SPECIFICATIONS (CONT.)

Recovery Action: Failure to obtain a reading within the specified frequency is permitted when the safety of personnel or performance of equipment will be adversely affected by weather or other conditions. (Examples: heavy snow fall or dust storms severe enough to compromise safety.) The deferral of required data is to be documented on a Problem Evaluation Request (PER), and is valid for a maximum of 72 hours from the time the specified frequency was exceeded. No additional deferral is allowed until a valid reading has been obtained. If data collection will be deferred more than 24 hours the Environmental Support and Assessment Program Manager must also notify Ecology.

If the leak detection devices required for compliance with the Safety Basis and the Settlement Agreement are functional, failure to obtain a valid reading within the required frequency is an OSD violation.

Recording and investigating a leak detector alarm, an abnormal surface level change, or an annulus CAM alarm is not an OSD violation. Failure to collect the required data or investigate an alarm is an OSD violation. For all data that exceeds the specification limits established in this document, the process outlined in TFC-ENG-CHEM-D-42, "Tank Leak Assessment Process" shall be followed.

If an OSD violation occurs, Operations Management shall issue a PER within one working day of the violation. The appropriate recovery shall be determined by the PER assignee and the recovery actions documented in the PER resolution. Ecology shall be notified per the requirements in TFC-ENG-ENV_FS-C-01, "Environmental Notifications" and an Occurrence Report shall be issued if required by TFC-OPS-OPER-C-24, "Occurrence Reporting and Processing of Operations Information".

4.0 LEAK AND INTRUSION DETECTION SPECIFICATIONS FOR CATCH TANKS AND MISCELLANEOUS VESSELS

There are three basic types of catch tanks. The first is a single tank with no vault or secondary containment. The second type is a primary tank within a vault or secondary containment. The third type is a Double Contained Receiver Tank (DCRT), which is typically used in waste transfers. It consists of a primary tank within a cement vault, but also has additional instrumentation and active ventilation to support waste transfers. This section addresses leak detection and intrusion detection requirements for all three types of tank.

All catch tanks and miscellaneous vessels associated with the SST system are subject to the TPA requirements contained in RPP-9937. This Functions and Requirements document sorts the SST catch tanks based on whether they are in use or not, whether they meet the Interim Stabilization criteria of less than 400 gallons, and whether they have been isolated or not. The result of this decision tree analysis yields either a weekly monitoring requirement, (if LDM is indicated), or an annual monitoring requirement, (if only intrusion monitoring is required). RPP-9937 does not address catch tanks in the DST system, so the existing daily monitoring requirement is still in effect for those tanks. Table 4.1 addresses DST catch tank leak detection monitoring requirements. Table 4.2 addresses leak and intrusion monitoring requirements for all tanks monitored under RPP-9937.

A measurement at the frequency specified is required for each tank listed in Table 4.1 and Table 4.2, from EITHER the primary tank level device (available in every tank), OR the secondary containment monitoring device (where available). Both leak detection measurements are considered equivalent for OSD compliance purposes.

The leak detection specification limit for secondary containment depends on the monitoring device available, and can be obtained from Table 2.2.

The leak detection specification limit in the primary tank is based on the installed instrument and the stability of the tank. Refer to Table 2.2 for applicable values. The appropriate limit can be referenced to either the established baseline, or the most recent data trend (trend analysis). Trend analysis consists of monitoring for a decrease from the trend established by previous readings. In general, tanks with very stable levels have baselines assigned and are subject to a fixed decrease criteria that is dependent on the accuracy of the instrumentation and stability of the tank. Tanks that change significantly on a regular basis, such that maintaining a valid baseline is impractical, use trend analysis. Trend analysis compares the most recent value with the previous data trend and looks for a change equal to the specification limit. See the Technical Basis section for further discussion of the trend analysis process.

4.0 LEAK AND INTRUSION DETECTION SPECIFICATIONS FOR CATCH TANKS AND MISCELLANEOUS VESSELS (CONT.)

Table 4-1 Catch Tank and Miscellaneous Tank Monitoring – DST System

Tank	Primary Tank Level Device	Secondary Containment Device	Required Frequency	Primary Tank Specification Limit	Secondary Containment Specification Limit
240-S-302	ENRAF	None	Daily	-0.5 in. from BL	None
244-A	Weight Factor	Weight Factor	Daily	Trend Analysis	+1.0 in. from BL
244-BX	Manual Tape	Manual Tape	Daily	Trend Analysis	+1.0 in. from BL
244-S	Weight Factor	Weight Factor	Daily	Trend Analysis	+1.0 in. from BL
244-TX	Manual Tape	Manual Tape	Daily	Trend Analysis	+1.0 in. from BL
311-ER	ENRAF	None	Daily	-0.5 in. from BL	None
A-302-A	ENRAF	None	Daily	-0.5 in. from BL	None
A-302-B	Manual Tape	None	Daily	-1.0 in. from BL	None
A-350	Weight Factor	Conductivity Alarm	Daily	Trend Analysis	Verify Alarm Status
AX-152	Manual Tape	None	Daily	-1.0 in. from BL	None
AZ-151	ENRAF	None	Daily	Trend Analysis	None
AZ-301	ENRAF	None	Daily	Trend Analysis	None
E/W Vent Station	Manual Tape	None	Daily	Trend Analysis	None
TX-302-B	ENRAF	None	Daily	-0.5 in. from BL	None
U-301-B	ENRAF	None	Daily	-0.5 in. from BL	None
UX-302-A	ENRAF	None	Daily	-0.5 in. from BL	None

Table 4-2 Catch Tank and Miscellaneous Tank Monitoring, RPP-9937

Tank	Primary Tank Level Device	Secondary Containment Device	Required Frequency	Primary Tank Specification Limit	Secondary Containment Specification Limit
A-417 *	Weight Factor	NA	Quarterly	+1.0 in. from BL	NA
S-304	ENRAF	NA	Quarterly	+0.5 in. from BL	NA
TX-302-C	ENRAF	NA	Quarterly	+0.5 in. from BL	NA
244-AR, TK-001	Weight Factor	NA	Quarterly	+1.0 in. from BL	NA
244-AR, Cell 1	NA	Weight Factor	Quarterly	NA	+1.0 in. from BL
244-AR, TK-002	Weight Factor	NA	Quarterly	+1.0 in. from BL	NA
244-AR, Cell 2	NA	Weight Factor	Quarterly	NA	+1.0 in. from BL
244-AR, TK-003	Weight Factor	NA	Quarterly	+1.0 in. from BL	NA
244-AR, TK-004	Weight Factor	NA	Quarterly	+1.0 in. from BL	NA
244-AR, Cell 3	NA	Weight Factor	Quarterly	NA	+1.0 in. from BL
244-CR-003	Zip Cord	None	Weekly	+/- 1.0 in. from BL	None

*A-417 is part of the DST system and is not formally covered by RPP-9937. However, ORP letter from R. J. Schepens to M. A. Wilson, Ecology, "Notification of Completion of Stabilization and Isolation of Catch Tank 241-A-417 to meet Hanford Federal Facility Agreement and Consent Order (HFFACO) Milestone M-48-07, 03-TOD-073, dated September 18, 2003 states that the tank is being included in the SST System closure plan. Since the tank meets M-48-07 requirements, it will be monitored for intrusion quarterly per this OSD.

Note: Action 5 of Administrative Order 00NWPKW-1250/1251 allows certain specified catch tanks in Table 4.1 to be monitored at a reduced frequency after isolation is complete. If isolation is completed on one of these tanks the new monitoring frequency may be immediately implemented until this OSD can be updated to reflect current status.

4.0 LEAK AND INTRUSION DETECTION SPECIFICATIONS FOR CATCH TANKS AND MISCELLANEOUS VESSELS (CONT.)

Technical Basis: For a single tank with no vault or secondary containment leak and intrusion detection normally consists of level measurements in the primary tank, looking for increases or decreases from the data trend or baseline. For a primary tank within a vault or secondary containment, leak detection can be accomplished by either monitoring for unexpected liquid increase in the secondary containment, (typically a low-point sump), or decreasing level in the primary tank. Intrusions are identified by unexpected level increases in either the primary tank or surrounding vault. An increasing level in the surrounding vault can be due to either an intrusion into the vault or a leak from the primary tank. In either case the anomalous data triggers an investigation, and the source of the increase is identified. For a DCRT, leak detection is accomplished by monitoring either the vault sump for liquid increases or the primary tank for unexpected decreases.

Some catch tanks are very stable, and surface levels rarely change. These tanks can be monitored using a fixed baseline and the appropriate increase/decrease criteria from Table 2.2. Other tanks collect process condensate daily, and rise continuously until they become full and are pumped empty again. The constant level changes make establishing and maintaining a fixed baseline impractical. Leak and intrusion detection is accomplished in these cases by observing for level changes deviating from the most recent data trend. In Table 4.1 this is referred to as "Trend Analysis". In essence, the baseline is continuously adjusted based on the most recent trend and the appropriate specification limit is then applied. Other tanks collect random transfer fluids and rainwater, and the surface level response is erratic. Even though the increases are unpredictable, the level should not decrease significantly unless the tank is being pumped. These tanks also use "Trend Analysis", and are monitored for decreases from recent data without an established baseline.

In tanks with secondary containment, the liquid level in the sump is monitored for unexpected increases. Any increase that exceeds the specification limit is investigated as a potential leak from the primary tank or an intrusion into the containment vessel. A conductivity alarm may also be used to identify the presence of unexpected liquid in the sump.

If a catch tank associated with the SST system is no longer active and is below the interim stabilization criteria of 400 gallons, then RPP-9937 does not require leak detection monitoring (LDM). These tanks are addressed in Table 4.2. The only TPA requirement is an annual check to verify that no intrusions are occurring. As with SST intrusion detection, Operations Management has agreed to collect this data quarterly to allow a statistically valid number of samples and improved response time.

Level-to-Volume conversion tables for the catch tanks can be located in RPP-11866, Appendix A. Refer to WHC-SD-WM-TI-573, RPP-9937, and RPP-11866 for an expanded discussion.

Detection/Control: Tables 4.1 and 4.2 list the current level measurement device for the primary tank and secondary containment of each catch tank or vessel, the required monitoring frequency, and applicable specification limits for both systems.

4.0 LEAK AND INTRUSION DETECTION SPECIFICATIONS FOR CATCH TANKS AND MISCELLANEOUS VESSELS (CONT.)

Pre-approved ALTERNATE devices for surface level measurements are ENRAF, FIC, Manual Tape, Zip Cord, and Weight Factor. A conductivity-type leak detection alarm may also be used to monitor for the presence of unexpected liquid in the secondary containment.

Recovery Action: The section below describes what does and does not constitute an OSD violation. It also describes actions to be taken if specified monitoring equipment is out-of-service. If the actions specified are taken within the allowable time period, no OSD violation will occur.

Obtaining or reporting data that exceeds a specification limit for either a primary tank or secondary containment monitoring device is not an OSD violation. For all data that exceeds the specification limits established in this document, the process outlined in TFC-ENG-CHEM-D-42, "Tank Leak Assessment Process" shall be followed.

Deferral of required readings for up to 72 hours is permitted when the safety of personnel or performance of equipment will be adversely affected by weather or other conditions. (Examples: heavy snow fall or dust storms severe enough to compromise safety.) The deferral of required data is to be documented on a Problem Evaluation Request (PER). No additional deferral is allowed until a valid reading has been obtained.

If a required reading is not obtained for any reason other than the 72-hour personnel safety deferral, a PER (TUF) shall be issued within 4 working days of the required frequency being exceeded. The PER shall include a corrective plan developed with the concurrence of the WFO System Engineering Manager, the appropriate WFO or CO Operations Manager, and the Environmental Support and Assessment Program Manager. This corrective plan shall contain a commitment date for resolving the problem and completing all actions required to be in full compliance with the OSD. Ecology shall be notified per the requirements in TFC-ENG-ENV_FS-C-01, "Environmental Notifications". Missing a required reading and committing to a corrective plan is not an OSD violation. If the commitment date in the corrective plan is exceeded without achieving OSD compliance, an OSD violation will occur.

If an OSD violation occurs, Operations Management shall issue a new PER declaring the violation within one working day. The appropriate recovery shall be determined by the PER assignee and the recovery actions documented in the PER resolution. Ecology shall be notified per the requirements in TFC-ENG-ENV_FS-C-01, "Environmental Notifications" and an Occurrence Report shall be issued if required by TFC-OPS-OPER-C-24, "Occurrence Reporting and Processing of Operations Information".

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 HANFORD PROJECT OFFICE
712 SWIFT BOULEVARD, SUITE 5
RICHLAND, WASHINGTON 99352

May 17, 1999

Linda K. Bauer, Assistant Manager
Environmental Restoration Program
U.S. Department of Energy
P.O Box 550, H0-12
Richland, Washington 99352

Re: 200 Area RI/FS Implementation Plan Approval

Dear Ms. Bauer:

The U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) have completed the review of the 200 Area Remedial Investigation/Feasibility Study Implementation Plan (DOE/RL-98-28/Rev. 0). This letter hereby serves as EPA's and Ecology's joint approval of the implementation plan as final.

If you have any question regarding this approval, please contact either Dennis Faulk (EPA) at 376-8631 or Jack Donnelly (Ecology) at 736-3013.

Sincerely,

Douglas R. Sherwood
Hanford Project Manager
U.S. Environmental Protection Agency

Michael A. Wilson, Program Manager
Nuclear Waste Program
Washington State Department of Ecology

cc: Jack Donnelly, Ecology
Bryan Foley, DOE
Administration Record (200 Area)